



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/496,506 02/02/00 NAYFEH

M 1201.63407

024978
GREER, BURNS & CRAIN
300 S WACKER DR
25TH FLOOR
CHICAGO IL 60606

MM91/1004

EXAMINER

CRANE, S

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 10/04/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application N .

Applicant(s)

09/496,506

NAYFEH ET AL.

Examiner

Art Unit

Sara W. Crane

2811

-- Th MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5,6,9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 5, it is not clear what is intended by the designation of silicon particles "implanted" in a gate area. In the semiconductor art, "implanted" refers specifically to a process of ion implant, where ions are accelerated and shot into a device layer. Applicant's specification does not seem to describe a process like this. Rather, page 11 lines 17-26, for example, describes a deposition or a co-deposition process, rather than an implant.

Also, what is meant by "a gate area"? Does this refer to gate insulator, the gate itself, or the substrate under the gate?

In claim 4, "an energy spacing" is not clear. Spacing between what?

In claim 5, "electron hole" is not clear. Does this mean an electron, or a hole?

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

Art Unit: 2811

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 5, and 8 (insofar as understood) are rejected under 35 U.S.C. 102(b) as being anticipated by Chen et al.

The Chen abstract teaches a transistor which stores a single electron (or hole). Figure 7 shows source 18, drain 14, and gate 16 (column 3, line 43). Silicon nanoparticles 34, 34', and 34'' are planted in the gate area under the gate electrode (column 7, line 28). The diameter of the nanoparticles may be 1 to 2 nm (column 4, line 55). Layer 30 is a tunnel oxide. Figure 9 also shows nanoparticles in the area under a gate electrode, with the top two layers completely separated from tunnel oxide 30. The single electron or hole stored in the nanoparticle controls channel current flow between source and drain (figure 10). This channel current must consist of at least a single electron. The device operates at room temperature (column 2, line 39).

Note that process limitations such as "implanted" would carry weight in claims drawn to a product only to the extent that the process limitation produces structure distinct from that of the prior art. *In re Thorpe*, 227 USPQ 964 (Fed. Cir. 1985). Burden is on the applicant to show that the process limitation does produce distinct structure.

Claims 1, 3, 5, and 8 (insofar as understood) are rejected under 35 U.S.C. 102(b) as being anticipated by Tiwari et al.

The Tiwari device is substantially the same as that taught by Chen et al., and would anticipate the claims for the same reason.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 (insofar as understood) is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. or Tiwari et al.

Claim 4 recites an energy spacing, but does not say what energy has the recited spacing. At any rate, absent any showing of criticality, it would have been obvious to design the device layer sizes and spacings to accommodate desired energy levels.

Claims 6 and 7 (insofar as understood) are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. in view of Matsumura et al., or over Tiwari et al. in view of Matsumura et al.

Column 3, lines 34-39, of Matsumura et al. teaches to move a carrier between quantum box and channel by means of application of light. It would have been obvious to inject carriers into the nanoparticles of the device of either Chen et al. or Tiwari et al. in the same manner, in order to erase a large number of devices at one time, as shown with respect to Matsumura figure 3.

Art Unit: 2811

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Crane, whose telephone number is (703) 308-4894.

The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist, whose telephone number is (703) 308-0956.



Sara W. Crane
Primary Examiner
Art Unit 2811